

REMARKS

The Examiner is thanked for carefully reviewing the present application. The present amendment is submitted in response to the final Office Action mailed January 8, 2003. The applicants have thoroughly reviewed the outstanding Office Action including the Examiner's remarks and the cited references. The above amendment and following remarks are believed to be fully responsive to the Office Action.

Reconsideration and allowance of the present application based on the following remarks is respectfully requested.

Claims 7, 15 and 18 are canceled, claims 1-6, 9-14 and 17 are pending. All the amendments in the specification and claims are made to overcome the Examiner's rejections. No new matter has been introduced through the foregoing amendments.

Entry of this Amendment under Rule 116 is merited as it raises no new issues and requires no further search.

1. Objection under 35 U.S.C. §132

The previously filed Amendment is objected to under 35 U.S.C.132 because it allegedly introduces new matter into the disclosure of the invention. The applicants have amended the specification to remove the alleged new matter. Any remaining objection is respectfully traversed. For the reasons that will be fully explained below, the applicants respectfully request that the section 132 objection be withdrawn.

In the paragraph beginning on line 19, page 8 and carrying over onto page 9 of the originally filed specification, the sentence "Subsequently, the silicon nitride layer 204 and the silicon nitride layer 210 is stripped by hot phosphoric acid in a wet bench" includes a grammatical error where the word "is" in the sentence should read as "are". In addition, a similar grammatical error is found in the section beginning on line 20, page 4, and carrying over

onto page 5 of the originally filed specification. In order to correct these errors, the two sentences mentioned above are amended.

Furthermore, according to the section beginning on line 20, page 4, and carrying over onto page 5, and FIG. 13 and FIG. 14 of the application as filed, both the silicon nitride layer 204 and the silicon nitride layer 210 are indeed stripped by hot phosphoric acid. See page 4, lines 20-21 of the original specification. Therefore, it is apparent that stripping both silicon nitride layer 204 and the silicon nitride layer 210 by hot phosphoric acid does not constitute new matter. The Examiner's allegation of new matter at point 1 of paragraph 1 of the Final Office Action should therefore be withdrawn.

In the paragraph beginning on line 19, page 8, and carrying over onto page 9 of the specification, the sentence regarding the temperature of the hot phosphoric acid has been deleted. The Examiner's objection at point 2 of paragraph 1 of the Final Office Action is believed overcome.

In the paragraph beginning on line 19, page 8, and carrying over onto page 9 of the amended specification, the sentence "Since the oxide layer 208 outside the shallow trench 206 is sandwiched in between the silicon nitride layer 204 and the silicon nitride layer 210 and is only contacted with the silicon nitride layer 204 and the silicon nitride layer 210, so the oxide layer 208 is also stripped while the silicon nitride layer 204 and the silicon nitride layer 210 are stripped in the wet bench" is changed to --Since the oxide layer 208 outside the shallow trench 206 is sandwiched in between the silicon nitride layer 204 and the silicon nitride layer 210 and is only contacted with the silicon nitride layer 204 and the silicon nitride layer 210, so the oxide layer 208 **outside the shallow trench 206** is also stripped because the foundation therebeneath is lost while the silicon nitride layer 204 is stripped-- (emphasis added). In other words, the oxide layer 208 outside the shallow trench 206 directly covers the silicon nitride layer 204. Thus, while the silicon nitride layer 204 is being etched away by the hot phosphoric acid, the

oxide layer 208 outside the shallow trench 206 is automatically peeled off since its foundation is lost, as shown in FIG. 13 and FIG. 14. Consequently, the oxide layer 208 outside the shallow trench 206 is not etched away, but peeled off since it loses the support of the silicon nitride layer 204 while the silicon nitride layer 204 is being etched away. Therefore, it is apparent that the oxide layer 208 outside the shallow trench 206 is removed while its foundation (silicon nitride layer 204) is stripped. Thus, stripping the oxide layer 208 outside the shallow trench 206 while the silicon nitride layer 204 and the silicon nitride layer 210 are being stripped is at least inherently supported by the original disclosure and does not constitute new matter. The Examiner's allegation of new matter at point 3 of paragraph 1 of the Final Office Action should therefore be withdrawn.

Accordingly, applicants respectfully request that the section 132 objection be withdrawn.

2. Claim Rejections under 35 U.S.C. 112, first paragraph

Claims 1-7, 9-15, 17 and 18 are rejected under 35 U.S.C.112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The Examiner alleges that there is no description in the specification as originally filed of the amendment to claim 1 or the amendment to claim 9 or the amendment to claim 17 related to removing the oxide layer while the nitride layers are being removed.

These rejections are respectfully traversed because the original specification at least inherently supports the claim limitation.

With regard to claims 1, 9 and 17, and the amended paragraph beginning on line 19, page 8, and carrying over onto page 9 of the specification, the oxide layer 208 outside the shallow trench 206 is sandwiched in between the silicon nitride layer 204 and the silicon nitride layer 210 and is only

contacted with the silicon nitride layer 204 and the silicon nitride layer 210. Therefore, it is apparent that while the silicon nitride layer 204 is being etched away by the hot phosphoric acid, the oxide layer 208 located directly on the silicon nitride layer 204 is peeled off since it loses the foundation (silicon nitride layer 204) located beneath.

Just described above, claim 1, 9 and 17 require removing the oxide layer between the nitride layers while the nitride layers are being removed which has been described in the amended specification and finds solid support in the original specification and drawings. Claims 1, 9 and 17 are therefore believed allowable. With regard to claims 2-7, 10-15 and 18, since claims 1, 9, and 17 are deemed allowable, and claims 7, 15 and 18 are canceled, dependent claims 2-6 each depending from independent claim 1, and dependent claims 10-14 each depending from independent claim 9 are likewise believed to be allowable. Accordingly, the applicants respectfully request that the 35 U.S.C. 112, *first paragraph* rejections be withdrawn.

3. Claim Rejections under 35 U.S.C. 112, *second paragraph*

Claims 1-7, 9-15, 17 and 18 are rejected under 35 U.S.C.112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention. These rejections are respectfully traversed. The applicants have canceled claims 7, 15 and 18, and particularly pointed out and distinctly claimed the subject matter considered as the invention, and the applicants respectfully request that the 35 U.S.C. 112, *second paragraph* rejections be withdrawn.

With regard to claims 1-6, 9-14 and 17, as discussed above, since the oxide layer 208 outside the shallow trench 206 is sandwiched between the silicon nitride layer 204 and the silicon nitride layer 210 and is only contacted with the silicon nitride layer 204 and the silicon nitride layer 210, a person of ordinary skill in the art would readily recognize that while the silicon nitride

layer 204 is being etched away by the hot phosphoric acid, the oxide layer 208 located directly on the silicon nitride layer 204 will lose its foundation and be peeled off. Therefore, it is respectfully submitted that claims 1-6, 9-14 and 17 have particularly pointed out and distinctly claimed the subject matters of the application.

Claims 1, 9 and 17 are rejected under 35 U.S.C. 112, *second paragraph* as being indefinite. The Examiner states that the use of "while" in claim 1, line 15, in view of the applicants' argument, is seen to be a recitation of in the same etching step, and requests that any other intended significance be clearly recited. With regard to claims 1, 9 and 17, while the silicon nitride layer located directly beneath the oxide layer is being etched away, the oxide layer directly located on the silicon nitride layer is peeled off because it loses its foundation, i.e. the silicon nitride layer located directly beneath, as detailed in the paragraph beginning on line 19, page 8, and carrying over onto page 9 of the amended specification. Therefore, the language of claims 1, 9 and 17 is definite. It is respectfully submitted that claims 1, 9 and 17 have particularly pointed out and distinctly claimed the invention.

Claims 7, 15 and 18 are rejected under 35 U.S.C. 112, *second paragraph* because it is unclear to the Examiner what temperature range is recited through the use of "hot". Since the applicants have canceled claims 7, 15 and 18, this rejection is moot.

Accordingly, the applicants respectfully request that the 35 U.S.C. 112, *second paragraph* rejections be withdrawn.

CONCLUSION

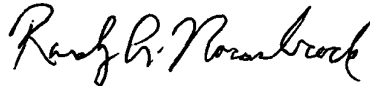
Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached appendix is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

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In light of the above amendments and remarks, it is respectfully submitted that the present application is now in condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please amend the paragraph beginning on line 10, page 4, and carrying over onto page 5, as follows:

For at least the foregoing aspects discussed above, the present invention provides a method of forming the shallow trench isolation structure. While forming the shallow trench isolation structure in the integrated circuits, the method of the present invention etches the oxide layer on the first silicon nitride layer of the active area by the wet etching until the first silicon nitride layer is about exposed. Then, the second silicon nitride layer is deposited, and subsequently a photoresist is formed on the second silicon nitride layer to cover the whole shallow trench area. Portions of the second silicon nitride layer and the oxide layer are removed by the photolithography and dry etching until the first silicon nitride layer underlying is about exposed, and the photoresist is stripped by using the wet strip or the dry strip. Afterward, both the silicon nitride layers [is] are stripped by using the hot phosphoric acid in the wet bench, and the thermal oxide layer is removed by the wet etching while using the hydrofluoric acid as the etching solution, so that the shallow trench isolation structure is formed. Therefore, the shallow trench isolation structure can be obtained without the chemical mechanical polishing process by employing the present invention, and not only the process cost can be reduced but also the yield can be enhanced. Furthermore, the thickness of the silicon nitride layer and the oxide layer can be controlled, and the stress problem resulted from the thick silicon nitride layer can be avoided in the present invention.

Please amend the paragraph beginning on line 19, page 8, and carrying over onto page 9, as follows:

Referring to FIG. 13, after the dry etching process, the photoresist 212 is stripped by using the wet strip or the dry strip so that the silicon nitride layer 210 is exposed. Subsequently, the silicon nitride layer 204 and the silicon nitride layer 210 are stripped by hot phosphoric acid in a wet bench[, and the temperature of the hot phosphoric acid is between about 150°C. and 200°C.]. Since the oxide layer 208 outside the shallow trench 206 is sandwiched in between the silicon nitride layer 204 and the silicon nitride layer 210 and is only contacted with the silicon nitride layer 204 and the silicon nitride layer 210, so the oxide layer 208 outside the shallow trench 206 is also stripped because the foundation therebeneath is lost while the silicon nitride layer 204 [and the silicon nitride layer 210 are] is stripped [in the wet bench]. And the thermal oxide layer 202 is removed by the wet etching while using the hydrofluoric acid as the etching solution, so that the completed shallow trench isolation structure 214 is formed, as shown in FIG. 14.

IN THE CLAIMS:

Please cancel claims 7, 15 and 18.